

directly adjacent to and on the same level as the generator room).

(h) *Three-wire, single-phase and four-wire, three-phase generators.* There must be circuit breaker poles for each generator lead, except in the neutral lead.

(i) *Three-wire, direct-current generators.* Each three-wire, direct current generator must meet the following requirements:

(1) *Circuit breaker poles.* There must be separate circuit breaker poles for the positive and negative leads, and, unless the main poles provide protection, for each equalizer lead. If there are equalizer poles for a three-wire generator, each overload trip must be of the "Algebraic" type. If there is a neutral pole in the generator circuit breaker, there must not be an overload trip element for the neutral pole. In this case, there must be a neutral over-current relay and alarm system that is set to function at a current value not more than the neutral rating.

(2) *Equalizer buses.* For each three-wire generator, the circuit breaker must protect against a short circuit on the equalizer bus.

(j) *Circuit breaker reclosing.* Generator circuit breakers must not automatically close after tripping.

[CGD 74-125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 81-030, 53 FR 17847, May 18, 1988; CGD 94-108, 61 FR 28277, June 4, 1996; 62 FR 23908, May 1, 1997]

§ 111.12-13 Propulsion generator protection.

For general requirements, see § 111.35-1 of this chapter.

Subpart 111.15—Storage Batteries and Battery Chargers: Construction and Installation

§ 111.15-1 General.

Each battery must meet the requirements of this subpart.

[CGD 94-108, 61 FR 28277, June 4, 1996]

§ 111.15-2 Battery construction.

(a) A battery cell, when inclined at 40 degrees from the vertical, must not spill electrolyte.

(b) Each fully charged lead-acid battery must have a specific gravity that meets section 22 of IEEE 45-2002 (incor-

porated by reference; see 46 CFR 110.10-1).

(c) Batteries must not evolve hydrogen at a rate exceeding that of a similar size lead-acid battery under similar charging condition.

(d) Batteries must be constructed to take into account the environmental conditions of a marine installation, including temperature, vibration, and shock.

[CGD 94-108, 61 FR 28277, June 4, 1996, as amended by USCG-2003-16630, 73 FR 65196, Oct. 31, 2008]

§ 111.15-3 Battery categories.

(a) A battery installation is classified as one of three types, based upon power output of the battery charger, as follows:

(1) *Large.* A large battery installation is one connected to a battery charger that has an output of more than 2 kw computed from the highest possible charging current and the rated voltage of the battery installation.

(2) *Moderate.* A moderate battery installation is one connected to a battery charger that has an output of between 0.2 kw and 2 kw computed from the highest possible charging current and the rated voltage of the battery installation.

(3) *Small.* A small battery installation is one connected to a battery charger that has an output of less than 0.2 kw computed from the highest possible charging current and the rated voltage of the battery installation.

(b) Batteries that generate less hydrogen under normal charging and discharging conditions than an equivalent category of lead-acid batteries (e.g., sealed batteries) may have their battery category reduced to an equivalent category of lead-acid batteries.

[CGD 74-125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94-108, 61 FR 28278, June 4, 1996]

§ 111.15-5 Battery installation.

(a) *Large batteries.* Each large battery installation must be in a room that is only for batteries or a box on deck. Installed electrical equipment must meet the hazardous location requirements in subpart 111.105 of this part.

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(b) *Moderate batteries.* Each moderate battery installation must be in a battery room, in a box on deck, or in a box or locker in another space such as an engineroom, storeroom, or similar space, except if a moderate battery installation is in a ventilated compartment such as the engineroom and is protected from falling objects, a box or locker is not required. A moderate battery installation must not be in a sleeping space. An engine cranking battery for one or more engines must be as close as possible to the engine or engines.

(c) *Small batteries.* Small size battery installations must not be located in poorly-ventilated spaces, such as closets, or in living spaces, such as state-rooms.

(d) *Battery trays.* Each battery tray must be chocked with wood strips or their equivalent to prevent movement, and each tray must have non-absorbent insulating supports on the bottom and similar spacer blocks at the sides, or equivalent provisions for air circulation space all around each tray. Each battery tray must provide adequate accessibility for installation, maintenance, and removal of the batteries.

(e) *Nameplates.* Each battery must be provided with the name of its manufacturer, model number, type designation, either the cold cranking amp rating or the amp-hour rating at a specific discharge and, for a lead-acid battery, the fully charged specific gravity value. This information must be permanently fixed to the battery.

(f) *Lining in battery rooms and lockers.* (1) Each battery room and locker must have a watertight lining that is—

(i) On each shelf to a height of at least 76 mm (3 inches); or

(ii) On the deck to a height of at least 152 mm (6 inches).

(2) For lead-acid batteries, the lining must be 1.6 mm ($\frac{1}{16}$ inch) thick lead or other material that is corrosion-resistant to the electrolyte of the battery.

(3) For alkaline batteries, the lining must be 0.8 mm ($\frac{1}{32}$ inch) thick steel or other material that is corrosion-resistant to the electrolyte of the battery.

(g) *Lining of battery boxes.* Each battery box must have a watertight lining to a height of at least 76 mm (3 inches)

that meets paragraphs (f)(2) and (f)(3) of this section.

[CGD 74-125A, 47 FR 15236, Apr. 8, 1982, as amended by CGD 94-108, 61 FR 28278, June 4, 1996; 61 FR 36787, July 12, 1996; 62 FR 23908, May 1, 1997]

§ 111.15-10 Ventilation.

(a) *General.* Each room, locker, and box for storage batteries must be arranged or ventilated to prevent accumulation of flammable gas.

(b) *Power ventilation.* If power ventilation is required, the following must be met:

(1) The power ventilation system must be separate from ventilation systems for other spaces.

(2) Electric motors must be outside the duct and compartment and:

(i) Have an explosion-proof motor for a Class I, Division 1, Group B location; or

(ii) Be at least 10 ft. (3 m) from the exhaust end of the duct.

(3) Each blower must have a non-sparking fan.

(4) The power ventilation system must be interlocked with the battery charger so that the battery cannot be charged without ventilation.

(c) *Large battery installations.* Each battery room for large battery installations must have a power exhaust ventilation system and have openings for intake air near the floor that allow the passage of the quantity of air that must be expelled. The quantity of the air expelled must be at least:

$$q=3.89(i)(n).$$

where: q=quantity of expelled air in cubic feet per hour.

i=Maximum charging current during gas formation, or one-fourth of the maximum obtainable charging current of the charging facility, whichever is greater.

n=Number of cells.

(d) *Moderate and small battery installations.* Each battery room or battery locker for moderate or small battery installations must have louvers near the bottom of the room or locker for air, and must be ventilated by:

(1) Ventilation that meets paragraph (c) of this section;

(2) An exhaust duct:

(i) That ends in a mechanically ventilated space or in the weather;